

CLAIMS

We claim:

1. A water or wastewater treatment method, comprising the steps of:
providing an Fe source, said Fe source comprising an Fe salt or a relatively high surface area Fe metal arrangement, and
contacting influent water including at least one contaminant with said Fe source in the presence of an oxygen comprising gas flow, wherein an outlet flow following said contacting step provides a reduction in a concentration of said contaminant from its level in said influent through oxidation of said contaminant or precipitation, co-precipitation, or reduction to metal form of said contaminant with said Fe source to form a metal sludge.
2. The method of claim 1, wherein said Fe salt comprises a ferrous salt.
3. The method of claim 1, wherein said Fe salt comprises ferrous sulfate or ferrous carbonate.
4. The method of claim 1, wherein said method is performed in a pH range of from 5 to 9.
5. The method of claim 1, wherein said Fe source is said Fe metal, said contacting step including ultraviolet irradiation.

6. The method of claim 1, wherein said method is performed in a fluidized bed reactor.

7. The method of claim 6, wherein said fluidized bed reactor includes at least one magnetic field source, further comprising the step of magnetically-controlled fluidizing.

8. The method of claim 1, further comprising the step of separating said outlet flow into treated effluent and said metal sludge, wherein said separating step comprises sedimentation or filtration of said metal sludge.

9. The method of claim 1, wherein said influent water includes chelated metal.

10. The method of claim 9, further comprising the step of contacting soil or sediment having metal with a chelating agent to form said chelated metal.

11. The method of claim 10, wherein said chelating agent comprises ethylenediaminetetraacetate (EDTA) or an EDTA derivative.

12. The method of claim 1, wherein said contacting step is performed at ambient conditions and exclusive of any externally applied energy sources.

13. The method of claim 1, wherein said relatively high surface area Fe metal arrangement comprises Fe filings, steel wool or Fe comprising granules.

14. The method of claim 1, wherein said Fe salt is a ferric salt, said contacting step including iron-reducing bacteria for reducing Fe^{+3} to Fe^{+2} .

15. A water treatment system, comprising:

a reaction chamber including an Fe source, said Fe source comprising an Fe salt or relatively high surface area Fe metal arrangement, at least one inlet and at least one outlet, and

a source of an oxygen comprising gas, said oxygen comprising gas fluidically connected to said reaction chamber,

wherein when influent water including at least one contaminant is contacted with said Fe source in the presence of said oxygen comprising gas, a flow emerging from said outlet provides a reduction in a concentration of said contaminant from its level in said influent through oxidation of said contaminant or precipitation, co-precipitation, or reduction to metal form of said contaminant with said Fe source to form a metal sludge.

16. The system of claim 15, wherein said reaction chamber is a fluidized bed.

17. The system of claim 15, wherein said Fe source includes Fe metal, said system including magnetic field source.

18. The system of claim 15, wherein said Fe salt comprises a ferrous salt.

19. The system of claim 18, wherein said Fe salt comprises ferrous sulfate or ferrous carbonate.

20. The system of claim 15, further comprising an ultraviolet or ultrasonic source.